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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,116	02/06/2004	Larry Y. L. Mo	2762P	8376

7590   05/03/2006

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EXAMINER
JACKSON, BLANE J

ART UNIT	PAPER NUMBER
2618	

DATE MAILED: 05/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _06 February 2004_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-18_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-18_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _06 February 2004_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Zhang (US 6,670,900) in view of Cafarella (US 2003/0223480).

As to claim 1, Zhang teaches a method for measuring receiver mixer IQ

mismatch in a transceiver, the method comprising:

Providing a training signal for a *receiver filter*, the training signal having periodic

uncorrelated I and Q signals (figure 1, column 3, line 39 to column 4, line 8),

Providing a training signal for a *receiver filter*, the training signal having periodic

uncorrelated I and Q signals (column 4, lines 9-18),

Determining a phase mismatch in the receiver mixer from IQ correlation over a

unit period and

Determining a gain mismatch in the receiver mixer from a power estimate of both

I and Q signal for the unit period (column 4, line 58 to column 5, line 35, receiver

calibration is performed during windows of the example OFDM signal where an inverse

of a determined imbalance matrix comprising gain and phase imbalance values are

applied at the post distortion component (340) to the I and Q signal).

Zhang is silent as to providing a training signal for a receiver mixer.

Cafarella also teaches a method to calibrate the I/Q balance where the calibration signal is generated in the baseband DSP and upconverted to RF in the transmit chain prior to injection prior to the receive mixers of the receive chain during a guard time interval or unit period, figures 1a, 1b and 4, paragraphs 0036-0038 and paragraph 0042).

It would have been obvious to one of ordinary skill in the art at the time of the invention to recognize the baseband I/Q receiver calibration method of Zhang as expanded to include the RF and mixer components as taught by Cafarella to additionally compensate for the receiver downconversion components as well as the baseband contributions to I/Q imbalance.

As to claims 2 and 14, Cafarella of Zhang modified teaches the method of claims 1 and 13 wherein providing a training signal further comprises closing an RF signal path between a transmitter and the receiver mixer and generating the training signal with the transmitter (figure 4, paragraphs 0037-0039).

As to claims 3 and 15, Zhang teaches the method of claim 1 and 13 further comprising estimating the I/Q mismatch iteratively (column 3, line 59 to column 5, line 18, test sequence, also, Cafarella: paragraphs 0020 and 0070, convergence of the process might require several basic cycles of calibration).

As to claims 4 and 16, Zhang teaches the method of claims 3 and 13 further comprising utilizing a pre-compensated signal as a measurement signal for the iterative estimation (column 4, line 58 to column 5, line 1).

As to claims 5 and 17, Zhang teaches the method of claims 3 and 15 further comprising performing post-correction using a latest available correction parameter and further estimating residual mismatch form post correction signals (column 5, lines 1-35, imbalance matrix is applied at the post distortion component (340) at each frequency, the test sequence).

As to claims 6 and 18, Zhang teaches the method of claims 1 and 13 further comprising utilizing matrix multiplication to perform mismatch compensation (column 5, lines 1-35, the inverse of the imbalance matrix is applied at each frequency.

As to claims 7 and 13, Zhang teaches a method and system for estimation of receiver filter IQ mismatch comprising:

A transceiver, the transceiver including a transmitter and a receiver, the transmitter providing a training signal for a *receiver baseband filter*, the training signal having periodic uncorrelated I and q signals (figure 1, column 4, lines 9-18 and line 58 to column 5, line 23) and,

A processor coupled to the receiver, the processor determining a phase mismatch in the receiver mixer from IQ correlation over a unit period, and determining a

gain mismatch in the receiver mixer from a power estimate of both I and Q signal for the

unit period (figure 1, column control components calibration control (310), post-distortion

(340 and pre-distort (330) comprise the processor of calibration/compensation system

(300) and determining phase and gain imbalance in the transmitter/ receiver calibration

of the respective baseband filters: column 4, line 19 to column 5, line 35).

Zhang is silent as to providing a training signal for a *receiver mixer*.

Cafarella also teaches a method to calibrate the I/Q balance where the

calibration signal is generated in the baseband DSP and upconverted to RF in the

transmit chain prior to injection prior to the receive mixers of the receive chain during a

guard time interval or unit period, figures 1a, 1b and 4, paragraphs 0036-0038 and

paragraph 0042).

It would have been obvious to one of ordinary skill in the art at the time of the

invention to recognize the baseband I/Q receiver calibration method of Zhang as

expanded to include the RF and mixer components as taught by Cafarella to

additionally compensate for the receiver downconversion components as well as the

baseband contributions to I/Q imbalance.

As to claim 8, Cafarella of Zhang modified teaches the system of claim 7 wherein

the transmitter provides a training signal on a closed RF signal path between the

transmitter and the receiver mixer (figure 4, paragraph 0038).

As to claim 9, Zhang teaches the method of claim 9 further comprising estimating the I/Q mismatch iteratively (column 3, line 59 to column 5, line 18, test sequence, also, Cafarella: paragraphs 0020 and 0070, convergence of the process might require several basic cycles of calibration).

As to claim 10, Zhang teaches the system of claim 9 further comprising utilizing a pre-compensated signal as a measurement signal for the iterative estimation (column 4, line 58 to column 5, line 1).

As to claim 11, Zhang teaches the system of claim 9 further comprising performing post-correction using a latest available correction parameter and further estimating residual mismatch form post correction signals (column 5, lines 1-35, imbalance matrix is applied at the post distortion component (340) at each frequency, the test sequence).

As to claim 12, Zhang teaches the system of claim 7 further comprising utilizing matrix multiplication to perform mismatch compensation (column 5, lines 1-35, the inverse of the imbalance matrix is applied at each frequency.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lehning et al. (US 2005/0107059), Hansen (US 7,020,220),
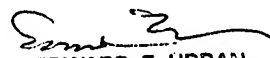
Loper (US 5,604,929), Loper (US 5,249,203, Lipowski et al. (US 5,828,955), Dubrovin

et al. (US 6,977,977, Lin et al. (US 2004/0038649) and Li (US 6,760,577).

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Blane J. Jackson whose telephone number is (571) 272-

7890. The examiner can normally be reached on Monday through Friday, 9:00 AM-6:30

PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

BJJ

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